



Assessing “team climate” in project teams

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Abstract

Team climate is an important factor in the pursuit of team effectiveness; however, the team climate concept has received limited attention in the project management field. This study helps to fill that gap by using Anderson and West's four-factor theory of team climate and their Team Climate Inventory [TCI: Anderson NR, West MA. The team climate inventory manual and users' guide. Windsor (UK): Assessment Services for Employment, NFER-Nelson; 1994] with 44 four-person teams of management undergraduates conducting team research projects. Statistical results for the TCI's five scales and 15 subscales showed positive team climates in this sample at the two TCI administrations, Time 1 (week 3) and Time 2 (week 12) in the project life cycle. Results of the qualitative analyses of participants' written comments with the TCI complemented the statistical results and showed that participants had positive team experiences and, improved their team skills among other effects. Recommendations are presented for using the TCI in building teams, project management training, and project evaluations among other uses.

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1. Introduction

Teams are essential in projects for tackling complex work requiring a variety of knowledge and skills, stimulating creativity and innovation, empowering workers, and other positive consequences. Much organisational research has addressed the aspects required for effective teams, for example, the success factors for cross-functional teams [1] and team commitment [2]. Unfortunately, the project management literature has somewhat neglected the important factor of team climate as a contributor to team effectiveness. Gray [3] examined a more macro-level construct of organisational climate in relation to project success. Gonzalez-Roma and his colleagues [4] examined a high-level construct called collective climate but a specific focus on the climate within project teams has been somewhat neglected. In work related to team climate, Tippet and Peters [5] examined six key elements of most successful team-building plans with a sample of 88 American companies that use project management. Their survey results underscored the

importance of quality standards, interpersonal communications and team goals in effective team-building. Gent and her colleagues [6] used Pinto and Pinto's [7] Cooperation Scale to study 59 project teams in 57 hospitals. They reported that high cooperation teams had higher levels of communication, had positive feeling about participating in the project teams and clearly understood project objectives—all characteristics of a positive team climate as will be seen later. Finally, Roffe [8] examined innovation and creativity in organisations including project-driven organisations. He noted that the creative organisational climate promotes group involvement, open-mindedness, effective communications, and rewards for innovation—all characteristics of a positive team climate.

1.1. Team climate theory

Anderson and West [9] applied the concepts of shared perceptions and organisational climate to understand the climate of work groups. They stated that three necessary but not sufficient conditions need to exist for shared perceptions and a shared climate to be possible at the group level: individuals must interact, individuals must have some common goal which predisposes

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individuals toward collective action, and there must be sufficient task interdependence to develop shared understandings.

Based upon extensive research into group climate and innovation, Anderson and West [10–14] developed a four-factor theory of group climate for innovation. The first factor, Vision, is the idea of a valued outcome which represents a higher-order goal and a motivating force for teams. Participative Safety, that is, participativeness and safety for members are essential for involvement in decision-making in teams. The third factor, Task Orientation, is a shared concern for excellence in task performance characterized by evaluation, critical appraisals, and modifications. Finally, Support for Innovation is the expectation, approval, and support for the introduction of new and improved ways of doing things.

1.2. *The Team Climate Inventory (TCI)*

The 44-item TCI [15] is a copyrighted, psychometrically-sound instrument commercially available since 1994 for assessing the multifaceted nature of team climate for description, diagnosis, and remedial actions to improve team climate and performance. The TCI taps not only the four factors or scales but their various components as measures by 13 subscales. A fifth scale, social desirability and its two subscales, assesses the tendency to respond in the socially desirable direction as indicated by high scores. Sample items for the subscales are presented in Table 1.

1.3. *Participative Safety (12 items)*

1. Information Sharing (3 items): degree to which info is shared.
2. Safety (2 items): degree to which one is willing to take risks.
3. Influence (3 items): degree to which decision-making is collective.
4. Interaction Frequency (4 items): less or more than average interaction.

1.3.1. *Support for Innovation (8 items)*

5. Articulated Support (4 items): degree to which innovative activities are encouraged.
6. Enacted Support (4 items): degree of practical support for the team.

1.3.2. *Vision (11 items)*

7. Clarity (2 items): degree of clarity of team objectives.
8. Perceived Value (4 items): degree to which objectives are perceived to be of value.

9. Sharedness (3 items): degree of agreement about team's objectives.
10. Attainability (2 items): degree of belief that team objectives are realistic and do-able.

1.3.3. *Task Orientation (7 items)*

11. Excellence (2 items): degree of commitment to high standards.
12. Appraisal (3 items): degree of monitoring and critical appraisal of each other.
13. Ideation (2 items): frequency to which members feel ideas are generated.

1.3.4. *Social Desirability (6 items)*

14. Social Aspect (3 items): the degree of disharmony and tension among members.
15. Task Aspect (3 items): the degree of feeling that the team functions below standard.

The TCI has a five-point response scale from “strongly disagree” to “strongly agree” where higher scores indicate a better or more desirable team climate. Scores for each item in a scale are summed to determine the scale score or, as published TCI articles report, scale means are calculated to maintain the original five-point scale for all scales and subscales even though the number of items varies from measure to measure.

1.4. *Psychometric properties of the TCI*

The extensive developmental work on the TCI is reflected in acceptable internal consistency reliabilities [15: see their Tables 8 and 9, p. 43], as measured by alpha coefficients, for scores from the four scales (0.84–0.94) and their sub-scales (0.73–0.91). There are also substantial interrelationships among the scores; for example, Anderson and West [9] reported correlations in the 0.35–0.62 range among scores from the scales and subscales.

As described in the manual [15], research has shown support for the construct, discriminant, and predictive validity of the four TCI scale scores. Agrell and Gustafson [16] provided support for the construct validity of the TCI when they found that TCI scale scores from their Swedish sample correlated positively (0.14 to 0.51) with scores from their Team Production Questionnaire although not all correlations were statistically significant possibly because of the small sample of teams ($N=16$). West and Anderson [13] found support for the predictive validity of TCI scores with a sample of management teams in 27 hospitals when TCI scale scores correlated with various innovation and effectiveness

Table 1
Sample items and remedial actions to improve team performance by TCI subscale

TCI subscale	Sample items and actions to improve team performance
Information sharing	Item 16: People keep each other informed about work-related issues in the team. Conduct communications skills training for staff and managers. Conduct a communications audit.
Safety	Item 13: we have a “we are in it together” attitude. Conduct self-assessment of interpersonal trust and assessment of inter-unit trust regarding the client organisation and the team’s own organisation. Conduct skills training in interpersonal communications, decision-making, negotiation, and problem-solving.
Influence	Item 8: Everyone’s view is listened to, even if it is in the minority. Assess individual and management decision-making styles and provide decision-making skills training. Similarly, provide negotiation, problem-solving, and communications skills training. Consider moving towards a more participative management style with greater staff involvement and empowerment
Interaction frequency	Item 5: We keep in regular contact with each other. Use team-building exercises especially at the beginning of the project. Make effective use of meetings and computer-mediated communications technologies.
Articulated and enacted support	Item 10: The team is open and responsive to change. Top management and the client must show support for the project through adequate resourcing to successfully complete the project according to the standards set. Top management and the client must value creativity, innovation, and risk-taking which implies a tolerance for failures too because not every idea leads to success. Provide creativity training and exercises for individuals and teams. Have individual and team reward systems that recognise creativity.
Clarity	Item 27: How clear are you about what your team objectives are? Require teams to produce clearly articulated and supported written objectives. Revisit objectives periodically during the project to keep the team focused or, if necessary, to revise objectives.
Perceived value	Item 34: How worthwhile do you think these objectives are to the organisation? The project must, in fact, be clearly related to the organisation’s mission and objectives and stand on it’s own merit; otherwise, why is the project is being done?
Sharedness	Item 30: To what extent do you think other team members agree with these objectives? Greater team member participation in problem solving and decision making should promote feelings of sharedness and commitment. Use team-building exercises especially at the beginning of the project.
Attainability	Item 32: To what extent do you think your team’s objectives can actually be achieved? Do team goal-setting exercises. Use a participative, group decision-making approach to test ideas and the like and to promote team commitment to selected goals and other decisions.
Excellence	Item 44: does the team have clear criteria which members try to meet in order to achieve excellence as a team? Use TQM and continuous improvement (CI) to promote the striving for excellence. Use group goal-setting. Use group as well as individual reward and recognition systems to motivate staff.
Appraisal	Item 41: Does the team critically appraise potential weaknesses in what it is doing in order to achieve the best possible outcome? Incorporate project evaluations, reviews, and audits as well as objective and fair team and staff performance evaluations periodically during the project to recognise achievements and, especially, to identify problems for early corrective actions.
Ideation	Item 42: Do members of the team build on each other’s ideas in order to achieve the best possible outcome? Use creativity training and exercises at the team and individual level to develop creativity skills. Recognize and reward creativity and innovation at both the team and individual level. Accept rather than punish failures, otherwise, staff will not be willing to take creative risks.

scores obtained 6 months later by expert and naive raters. More recently, Williams and Laungani [17] reported that scale scores on the TCI distinguished primary health care teams from three other types of health care teams; thus illustrating the discriminant validity of TCI scale scores.

Unfortunately, there has not been any substantial validity work published on the social desirability scale and its two subscales so these scores are not used in the present study.

1.5. *The study*

Overall, the limited number of studies support the use of the TCI in assessing team climate. However, studies have not used the TCI as a self-assessment tool for team members, or as a diagnostic tool for poor performing teams, or as a team building tool among other possible applications. This exploratory study aimed to help fill those gaps by using the TCI as a tool to sensitize project team members to the multidimensional concept of team climate as developed in Anderson and West's [9] four-factor theory; to promote critical self-awareness about one's own attitudes and perceptions of team process; to help team members diagnose their team climate; and to encourage team members to take specific actions, based upon their TCI scores, to improve their team climate over the project life cycle. Specific actions are presented in Table 1 for the various subscales so that teams can select the actions that would address their own team's needs.

2. Method

This study involved 44 four-person teams of management undergraduates conducting semester-long (13 weeks) research projects worth 35–45% of their final grade. Team members completed the TCI and offered their written comments about their team climate in week three of semester (Time 1) at which time their project proposals were due for grading and approval. The scored TCIs together with a detailed and confidential feedback handout describing the theoretical development and purposes of the TCI, the scores for the individual student as well as for his or her team and the class as whole were distributed at the following class. There was also class discussion about the meaning of the various scales and subscales and, importantly, what specific actions members and teams could take to improve their team climate for each TCI subscale over the remainder of the project. The same procedure was repeated towards the end of semester, some 9 weeks later (Time 2), when teams submitted their final project reports for grading. An additional question placed at the end of the TCI asked, "Have you improved your

'team skills' by participating in this team?" followed by the same five-point scale as the TCI.

The participants' confidential written comments about team climate were solicited at each TCI administration to provide qualitative data to complement the quantitative TCI data and, thus, to provide a richer picture of team climate than would be provided by the quantitative TCI data alone. Soliciting written comments enabled team members to present desirable and undesirable incidents that affected their team climate, to describe how they as individuals and as a team improved their team performance over the project life cycle, and any other comments they wished to present.

3. Results

3.1. *Quantitative analyses*

The means and standard deviations of TCI scores for the five scales and 15 subscales for the total sample are presented in Table 2 for both TCI administrations (Time 1 and Time 2) separated by about 9 weeks. As shown in the one-tailed *t*-tests in Table 2, there were statistically significant differences in mean scores between Time 1 and Time 2 for the Attainability ($t=2.58$, $df=167$, $P<0.01$), Interaction Frequency ($t=2.22$, $df=167$, $P<0.05$), and Clarity ($t=2.02$, $df=167$, $P<0.05$) subscales. Mean scores were higher at Time 2 on the Interaction Frequency and Clarity subscales but lower for the Attainability subscale than at the Time 1. Overall, as seen in Table 2, there were virtually no changes in mean scores for the TCI scales and most of the subscales.

The responses on the five-point scale to the evaluation question, "Have you improved your 'team skills' by participating in this team?", were positive at Time 1 ($M=3.57$, $S.D.=0.97$) and Time 2 ($M=3.87$, $S.D.=1.01$) with a statistically significant, albeit small improvement in mean score at Time 2 ($t=1.66$, $df=167$, $P<0.05$).

3.2. *Qualitative analyses*

Content analysis is a research technique for objective, systematic description and analyses of communications to draw inferences [18,19]. This technique encompasses both quantitative and qualitative approaches. Qualitative content analysis could identify themes [20] in a data set where the unit of analysis can cover a broad range from single words, phrases, sentences, and up to whole texts depending upon the purpose of the research [19,20].

The direction of themes as well as an indication of intensity can often be determined when attitudes are expressed because one can express positive (favorable) or negative (unfavorable) attitudes [21]. While some

Table 2
Descriptive statistics for scores on the TCI scales and subscales at two times

TCI scales and subscales	Time 1 (Week 3)		Time 2 (Week 12)		One-tailed <i>t</i> -tests
	<i>M</i>	S.D.	<i>M</i>	S.D.	
Participative Safety Scale	3.93	0.59	3.98	0.61	0.76 ns
Information sharing subscale	4.09	0.65	4.07	0.68	−0.21 ns
Safety subscale	3.93	0.79	3.95	0.75	0.22 ns
Influence subscale	3.99	0.56	3.98	0.62	−0.14 ns
Interaction frequency subscale	3.70	0.90	3.90	0.79	2.22 <i>P</i> < 0.05
Support for Innovation Scale	3.94	0.59	3.92	0.59	−0.37 ns
Articulated support subscale	3.92	0.65	3.88	0.60	−0.61 ns
Enacted support subscale	3.96	0.61	3.96	0.64	0.00 ns
Vision Scale	4.04	0.55	4.01	0.55	−0.27 ns
Clarity subscale	3.85	0.79	4.03	0.68	2.02 <i>P</i> < 0.05
Perceived value subscale	3.90	0.61	3.86	0.65	−0.57 ns
Sharedness subscale	4.05	0.62	4.02	0.61	−0.43 ns
Attainability subscale	4.34	0.61	4.17	0.63	−2.57 <i>P</i> < 0.01
Task Orientation Scale	3.83	0.57	3.85	0.58	0.35 ns
Excellence subscale	3.82	0.72	3.87	0.72	0.56 ns
Appraisal subscale	3.65	0.72	3.73	0.63	1.16 ns
Ideation subscale	4.01	0.63	3.95	0.73	−0.82 ns
Social Desirability Scale	3.63	0.59	3.60	0.70	−0.34 ns
Social aspect subscale	3.79	0.65	3.72	0.82	−0.85 ns
Task aspect subscale	3.46	0.63	3.49	0.74	0.41 ns
Improved team skills	3.75	0.97	3.87	1.01	1.66 <i>P</i> < 0.05

themes might express neutral attitudes or express a balance of positive and negative attitudes, most attitude-based themes would likely cluster into positive or negative themes.

The implications of these qualitative analyses for promoting a positive team climate are clear. First, positive themes should be reinforced. Those actions that are working well in a team (e.g. effective interpersonal communication and support within a team) should be reinforced to ensure that the team continues, or even improves those actions over the project life cycle. Second, comments that reflect a problem within a team (e.g. ineffective task orientation due to ineffective team meetings) require an effective and timely intervention (e.g. set meeting agendas with time limits and accountability for follow-up actions) to improve team climate over the remaining project life cycle.

3.2.1. A positive team start

A large number of comments at the first TCI reflected a positive team climate and favorable start to the project and proposal phase. It was reassuring to see a positive project kick-off in most teams marked by favorable interpersonal relations among team members, enthusiasm about their projects, and an expectation of quality project work.

- We're starting to warm up to each other and I believe we will be a great team.
- By stating objectives early, we were able to help each other with our assignment in order to be productive and achieve our objective.
- Our team is still early in its development, but I have a strong feeling that we will be able to produce a product that is going to be well above average and completed with skill and still have some fun doing it.
- We all know what's expected and work hard to achieve it. It's still early, but we seem to have very positive group dynamics.

3.2.2. A difficult team start

In contrast, some teams expressed frustrations and experienced some set backs at the start of the project. Clearly these sorts of comments underlined the need for interventions to prevent the disintegration of project teams and project failure. The sorts of interventions presented in Table 1 (e.g., team brainstorming for creativity about project ideas and finding alternative team meeting arrangements such as e-mail to accommodate busy team members) would help troubled teams improve and successfully complete their project.

- I think we really need to get it together, because our proposal was not done as well as I know it could have been.
- We tend to have a hard time putting ideas on paper and coming up with practical ways to test them.
- Scheduling difficulties (i.e. juggling work, other groups, and this group) have been worked out quickly and easily. All great people but all very busy.

3.2.3. *Recognizing the importance of team skills*

Some participants made comments that stressed the importance of learning team skills as part of their management education and for their later professional work life. Such learning from experience and acknowledging the value of learning reflects critical self-awareness and an orientation towards future learning—values that should be reinforced in team building and developing project managers.

- [team project] represents an excellent learning experience and promotes lessons to be learned. Promotes professionalism.
- In a team environment it's not always the end result but how you got to that result and what you learned from it.

3.2.4. *The project team was a good experience*

Some comments at the second TCI noted that their team experience was very positive or that the team climate and functioning had improved over the life of the project. It was reassuring to see team climate improve during the project.

- Throughout the semester, team skills have improved and there is a great concern for other members of the team.
- After knowing the group members for two months, I feel now that I can work with them very well, better than two months ago.
- I love this team!!
- Sometimes I feel tense because my ideas are not discussed—they are usually pushed aside and as a group we find other ideas. So I guess it balances out.

3.2.5. *Some persistent team difficulties*

On the other hand, some comments at the second TCI noted persistent problems. Clearly, interventions to improve team climate were not effective for some teams; this emphasizes the need to more closely monitor problem teams and intervene repeatedly with some teams to effect improvement.

- There is always one member that seems to be difficult.
- Sometimes, team climate wasn't the best but we worked to get the project done.
- I believe one member has other "things" in her life that is making her stressed out which affects our team climate.

3.2.6. *Recognizing the importance of team skills*

As with the first TCI, some comments stressed the importance of team skills.

- Establishing team climate or dynamics takes time but pertinent to represent real world management practices.

4. Discussion and recommendations

The statistics for the TCI, as shown in Table 2, revealed that team climate was positive at the first TCI, so it is not surprising to find limited statistically significant improvement at the second TCI given the high scores at Time 1. The qualitative findings revealed mostly positive team perceptions and experiences at both times with only a few team members expressing frustrations with team work or with another team member. Importantly, participants believed that they improved their team skills as demonstrated by the statistically significant increase in mean scores on the five-point scale (Time 1: $M=3.57$, $S.D.=0.97$; Time 2: $M=3.87$, $S.D.=1.01$; $t=1.66$, $P<.05$).

Several recommendations follow from this study and the TCI literature [9,13] for project managers, trainers, and organisations to consider.

- A basic use for the TCI would be to arouse critical self-awareness about one's own relationship to the team and perceptions about the team climate. Critical self-awareness is a necessary precondition before one can act to improve one's behavior in the team and improve team climate.
- The TCI can be a useful tool to assist project managers and trainers in team building exercises. As in the present study, the TCI could be administered shortly after teams are formed as an initial team diagnosis and then again at different phases in the project to reinforce strengths and identify areas for improvement (see Table 1 for specific actions to improve each TCI subscale area).
- The TCI should also be useful in project management training and development to sensitize potential project managers to the complex nature of team climate and the specific actions needed to develop and maintain a supportive and innovative team climate.

- The TCI could be used as part of project audits and staff evaluations to assess team functioning and identify training needs in response to weak areas identified by low TCI subscale scores.

In conclusion, this study not only lends further support to the usefulness of the team climate construct and the TCI instrument as the originators Anderson and West proposed [9–15] but extends their work to show the usefulness of repeated TCI administrations in reinforcing project members' attention to the different components of team climate. Further research, for example, using TCI administrations at different time periods during the project life-cycle and different types of remedial interventions would be useful in identifying optimal procedures for promoting team effectiveness. In contrast to the present study in which all teams had positive team climates from the beginning of their projects, it would be useful to track problem teams to determine if the TCI and remedial interventions would substantially improve team climate.

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